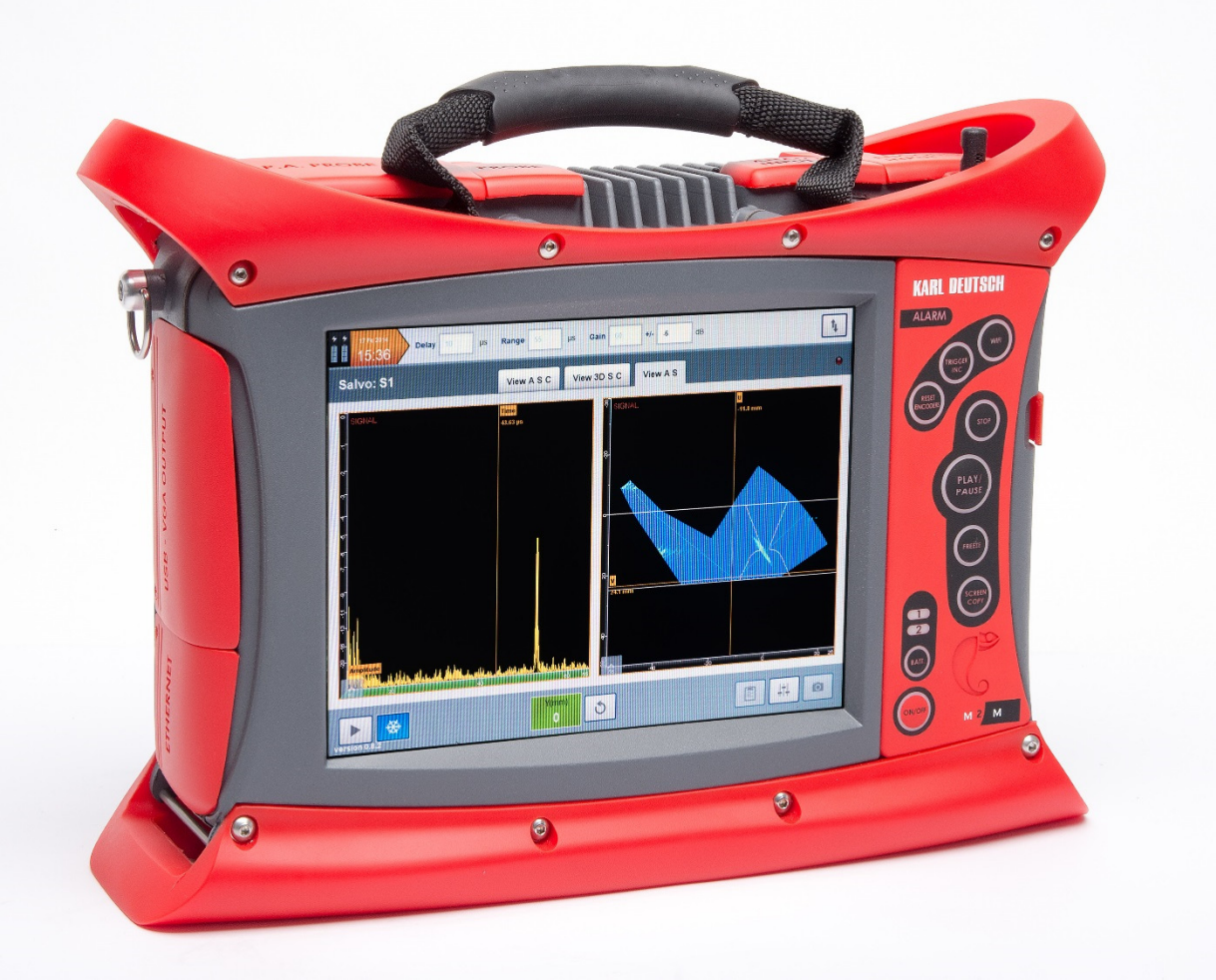
KARL DEUTSCH

KARL DEUTSCH · POSTFACH 13 23 54 · 42050 WUPPERTAL

Product Description GEKKO

Portable ultrasonic flaw detector for phased array, TOFD und conventional inspection techniques.



Basic functions of the universal flaw detector GEKKO

Phased array techniques

Phased array probes consist of multiple piezoelectric elements, which can be exited one after the other or time delayed. Thus, the sound field can be electronically moved (linear scan) or swivelled (sector scan). Either longitudinal or transversal waves and with appropriate angle settings also surface or creeping waves can be generated.

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Nationalbank AG Wuppertal, BLZ 360 200 30, Konto 6 714 552
BIC: NBAGDE3EXXX, IBAN: DE39 3602 0030 0006 7145 52
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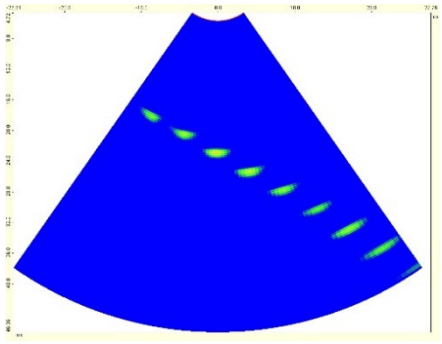
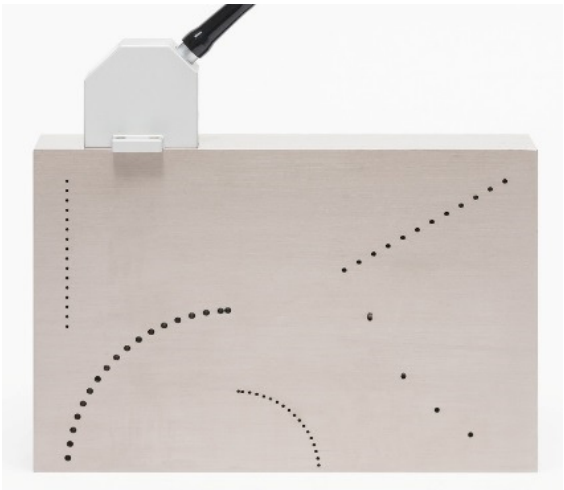
By electronic focusing of the sound field in a certain depth or a depth range, B-scans (slice views perpendicular to the surface) can be generated.



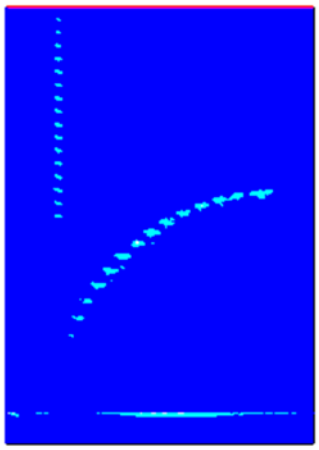
Example slice view with swivelled sound field from -30 °to +30 °

In the example given above the acoustic image of a row of side drilled boreholes in a reference block is shown. The GEKKO features a calibration function to adjust the echo amplitudes for all sound paths and angles to the same value. The lateral spatial resolution equals the diameter of the focused sound field.

The Total Focusing Method (TFM) is a unique feature and comparable to sampling phased array techniques. It generates B-scans with a spatial resolution of one (!) wavelength:



Reference Block ASTM 2491



TFM B-scan

The examples show B-scans (slices) obtained from straight-beam insonification with longitudinal waves. Angle-beam insonification with transversal waves is also possible.

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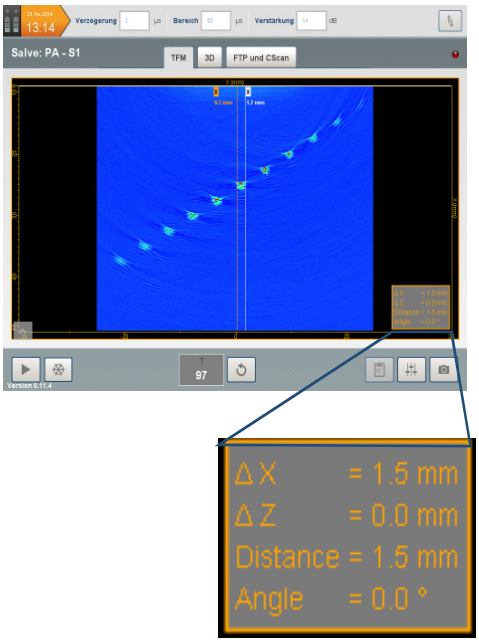
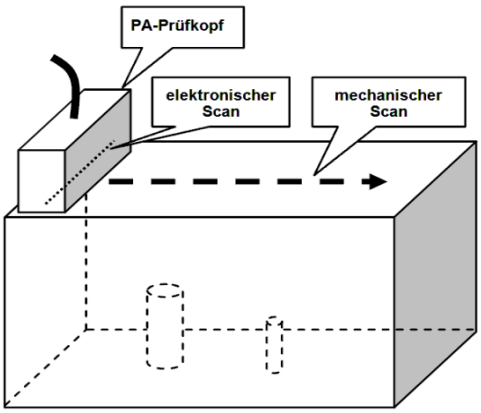
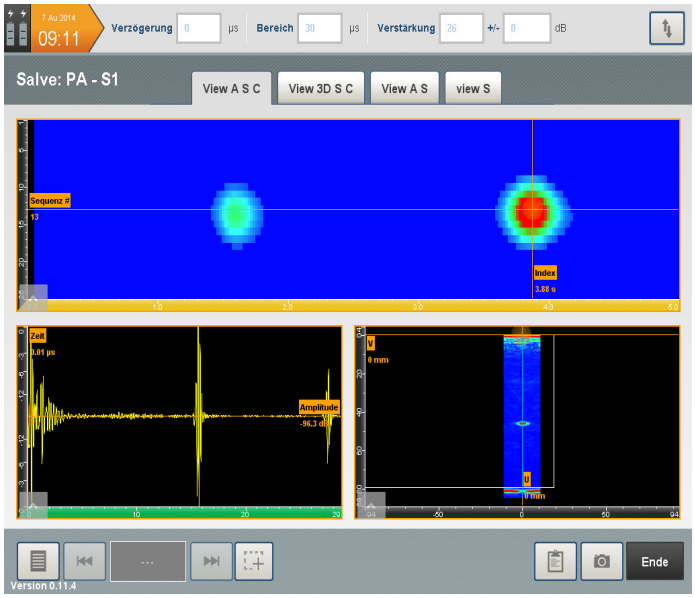
Reflector sizes are measured using cursors. The following example shows the TFM B-Scan of a row of 1.5 mm diameter boreholes. As a result the correct diameter of 1.5 mm is shown (see box):



If the probe is mechanically moved, many such B-scans are generated and a summarizing C-scan (top view) can be derived:



Top: Inspection setup, reference block with artificial flaws



Right top: C-scan

Right bottom: A- und B-scan

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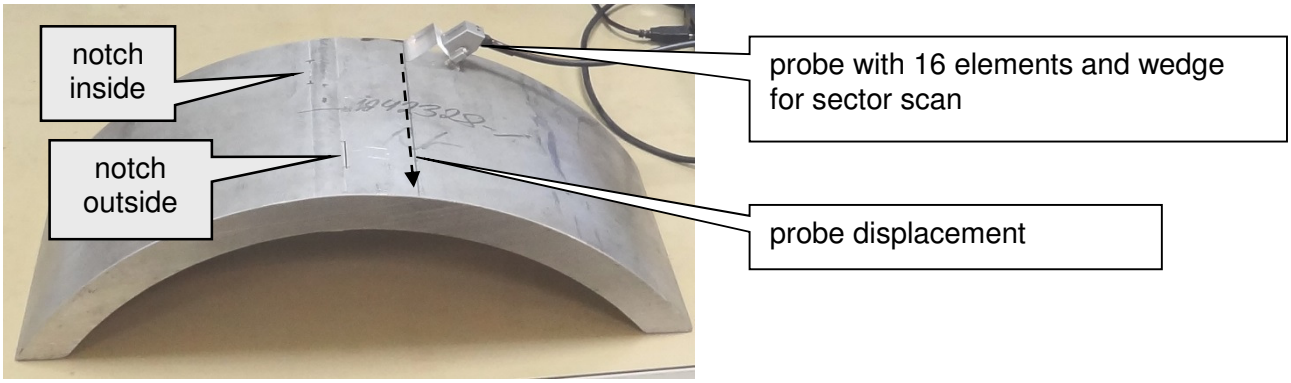
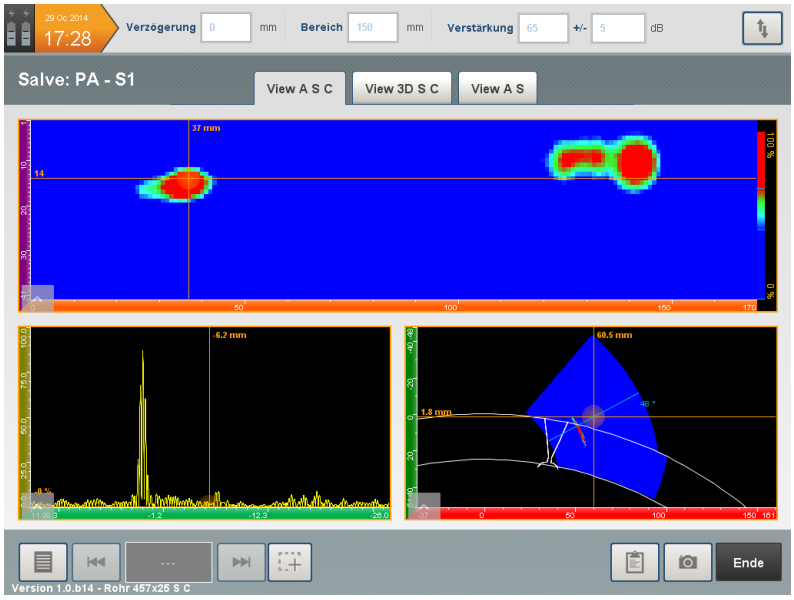
The examples presented here are based on straight-beam insonification measurements with longitudinal waves. The same features are also available for angle-beam insonification with transversal waves.

The inspections can even be performed on curved surfaces. This is, for example, necessary for longitudinally welded seams on pipes.





A-, B- and C-scan of a longitudinally welded seam on a pipe

Furthermore, the GEKKO offers multichannel inspection. This enables, for example, testing of welds with multiple probes and techniques in a single pass. A manual inspection can be carried out partially mechanized with a scanning device for multiple probes.

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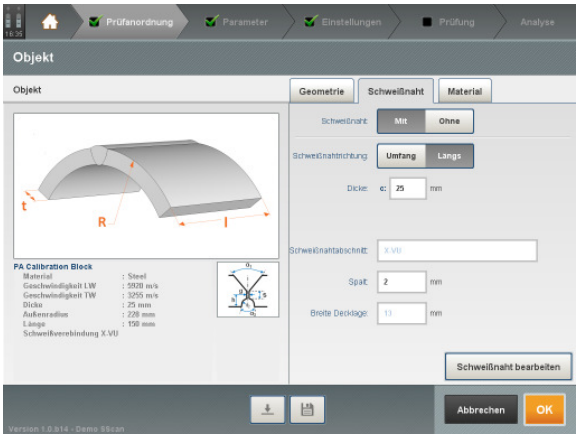
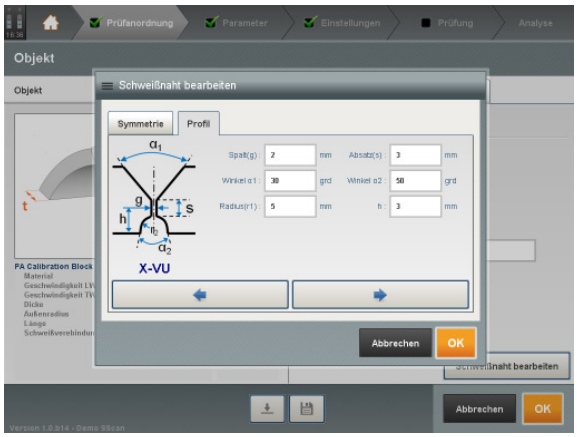
For the inspection of welding seams a configuration wizard is available. After selecting from 14 different symmetrical and 7 asymmetrical weld seam geometries, all the necessary geometrical parameters are specified:



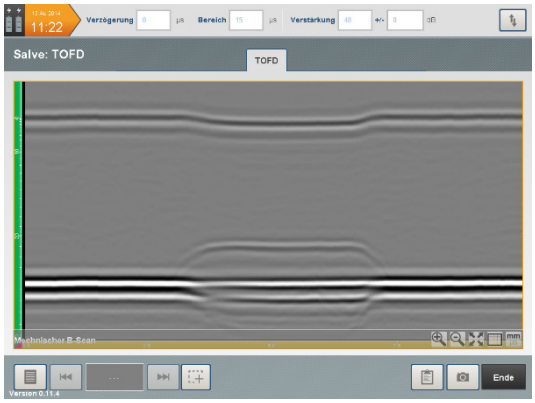


TOFD (Time of Flight Diffraction)

The phased array inspection is often combined with TOFD. By time of flight measurements between diffraction signals from crack tips or lack of fusion in welds, the depth and depth extension of flaws can be determined accurately.

With TOFD one is also able to clearly detect and display flaws parallel to the surface, e.g., lack of fusion between the layers or lacks of bonding between ferritic material and austenitic cladding.

Weld inspection with TOFD scanner



Typical TOFD image with correct depth scale

Other testing techniques

In addition to the presented phased array and TOFD testing techniques conventional ultrasonic inspection with single element or TR probes and straight- or angle-beam insonification can be performed.

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Technical Data	
Dimensions	408 mm x 284 mm x 130 mm
Weight	7.5 kg (including 2 batteries)
Power supply	2 Li-ion batteries
Battery runtime	at least 3 h 15 min
Internal memory	SSD 128 GB
Connections	1 IPEX connector for phased array probes, 64 channels 4 Lemo 00 connector for conventional UT 3 encoder inputs, bi-axial quadrature 1 external trigger for smart flexible probes 1 VGA Output 3 USB2 Ethernet, wireless
Screen	10.4“ (diagonal) touchscreen 1024 x 768 pixel resolution brightness: 400 cd/m^2
Pulsers	negative square pulse, width: 30 to 1250 ns 10 to 100 V for phased array 10 to 200 V for conventional UT Pulse repetition rate: 1 to 10 kHz
Max. number of focal laws	4069
Digitizing depth	up to 65,000 samples
Sampling frequency	3.1 to 100 MHz
Signal averaging	up to 64 times
Gain	analogue 0 to 46 dB digital -40 to +40 dB
Input impedance	50 Ω
3 dB bandwidth	0.55 to 14.3 MHz for phased array 0.60 to 25 MHz for conventional UT
Cross-talk damping between two channels	> 50 dB

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